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ABSTRACT

This examination of the use of computer-mediated communication (CMC) systems by individuals for the purpose of broadcasting messages to large numbers of recipients begins by contrasting CMC broadcasting with traditional conceptions of interpersonal and mass communications. Several alternative theoretical perspectives are then examined, and a set of propositions are derived regarding potential uses and effects of CMC broadcasting in an organizational setting. Also described is a preliminary empirical test of several propositions which is based on a survey of electronic mail users in one large organization. Finally, a highly speculative look is taken at potential policy issues suggested by the conceptual and empirical analyses as they relate to both businesses and home consumers. The text is supplemented by four tables and 53 references are provided. (EW)

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COMPUTER-MEDIATED COMMUNICATION SYSTEMS AS MASS COMMUNICATION MEDIA

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COMPUTER-MEDIATED COMMUNICATION SYSTEMS AS MASS COMMUNICATION MEDIA

New applications of communication technologies have blurred distinctions among traditional communication forms and strained established schemes for the categorization of media. The convergence among heretofore separate media has confounded attempts by policy makers to fit new media into old frameworks (cf. Pool, 1983), and is forcing communication theorists to explore unfamiliar terrain (Rice & Williams, 1984; Reardon & Rogers, 1986). Attempts to view new media through old glasses limit our conceptions of the uses of new forms of communication, as well as the questions we pose about media effects.

Perhaps nowhere is the strain as apparent as on the familiar interpersonal vs. mass media classification of communication forms (Ball-Rokeach & Reardon, 1987; Reardon & Rogers, 1986). New telecommunication and computer-based media may at times be similar to a typical interpersonal, face-to-face conversation, such as an electronic "chat" between two people on a Le Minitel "messagerie." On the other hand, an individual posting an electronic advertisement on a computer network bulletin board seems closer to our conceptions of a mass media application. Wiio (1988) recently observed that rather than "demassifying" mass communication (e.g. through narrowcasting), new technologies are more likely to "massify" interpersonal communication.

It is this massification of interpersonal communication that forms the focus of this manuscript. In particular, we concentrate our analyses on the use of computer-mediated communication (CMC) systems by individuals for the purpose of broadcasting messages to large numbers of recipients. Opportunities for CMC broadcasting occur in a variety of social contexts, and on a variety of technological systems. Large intraorganizational

electronic mail systems invariably support the capability to create large public distribution lists. These lists of user "mailboxes" are maintained by the system; all listed mailboxes receive any message addressed to the list itself. These may be centrally administered or user created, a distinction that can influence the range of uses and effects. Public videotex systems (such as the French Teletel - or more popularly, Minitel - System) and the information utilities (such as CompuServe in the U.S.) also provide opportunities for one-to-many communication. This occurs through "messageries" in the former and asynchronous "special interest group" (SIG) conferences, chat lines (eg., CB Simulator), and synchronous conferencing (eg., the Convention Center) in the latter. A third forum for CMC broadcasting is on one of the many computer bulletin board systems, felt by some to be an emerging mass medium (Rafaeli, 1986). Finally, several commercial electronic mail services and other publicly available intercompany networks support distribution lists and conferencing applications (e.g. ComServe service available on BITNET, an interuniversity computer network).

None of the above examples of CMC broadcasting can match the scope of a television network broadcast reaching millions of viewers simultaneously, and so are arguably not true mass media in the traditional sense. However, CMC broadcasting provides for the simultaneous distribution of the same message to geographically dispersed potential audiences numbering in the tens, hundreds, or thousands. Moreover, there are a number of reasons to expect the opportunities for broadcasting over CMC systems to increase. First, the penetration of personal computers in both home and organizational contexts continues to escalate at at rapid rate. Recent estimates are that nearly a fifth of all homes in the U.S. now have some form of personal computer (although not all are equipped with modems) (Dutton, Rogers, and Jun, 1987). Second, the subscriber bases of public information utilities in the U.S. and videotex systems in Europe are growing. The French success with videotex now seems to be influencing other nations that have had limited

success to take a fresh look at French videotex implementation strategies. Third, literally thousands of local bulletin board systems have sprung up in the last decade, and many are now linked together in a vast bulletin board network called FIDONET. Fourth, organization electronic mail systems in some companies have grown quite large, in some cases numbering in the tens of thousands of mailboxes across the globe. Moreover, the adoption by the CCITT of the X.400 Message Handling Standard has stimulated interconnection between previously separate networks, further expanding the size of the potential audience. Interorganizational networks are the next stage (Burstyn, 1983), and are becoming more common. In the U.S., a recent justice department decision to allow the Bell Regional Holding Companies to offer electronic mail and gateways for information service providers will further broaden the reach of CMC systems. Finally, the eventual implementation of the Integrated Services Digital Network (ISDN) will facilitate the growth of electronic mail networks, in both residential and business market sectors.

The remainder of the paper is organized as follows. First, we contrast CMC broadcasting with traditional conceptions of interpersonal and mass communication. We then examine several alternative theoretical perspectives and derive a set of propositions regarding potential uses and effects of CMC broadcasting in an organizational setting. A preliminary empirical test of several propositions is then described, based upon a survey of electronic mail users in one large organization. A discussion of the empirical analyses follows. Finally, we conclude with a highly speculative look at potential policy issues, both for businesses and home consumers, that are suggested by the conceptual and empirical analyses.

Contrasts Between CMC Broadcasting and Traditional Mass Communication

A number of authors have provided detailed analyses of the attributes of computer-mediated communication, highlighting features that in some way influence the communication

process (cf. Hiltz & Turoff, 1978; Kerr & Hiltz, 1982; Miller & Vallee, 1980; Steinfield, 1986b; Wynn, 1980). More recently, typologies allowing the comparison of attributes of new technologies like CMC with interpersonal and mass communication have been proposed by Reardon & Rogers (1986) and Ball-Rokeach & Reardon (1987). As Ball-Rokeach & Reardon observe, CMC systems enable the simultaneous and rapid distribution of messages to geographically dispersed and potentially large audiences - the fundamental characteristics of a mass communication system. Other similarities noted by these authors include dependence upon hardware, mediation of the message, and electronic distribution. A more complete conceptualization of CMC broadcasting requires attention not only to similarities, but also differences between mass-oriented CMC uses and traditional mass communication. This contrast can help highlight new potentialities for use of CMC quasi-mass media which in turn suggest emerging policy issues. Below, we focus on a subset of CMC characteristics with particular relevance to broadcast applications, and that appear to differentiate it from other forms of broadcasting.

The Computer as Medium. CMC systems provide more than a simple conduit for text delivery. A host of message creation, delivery, reception, and filing options make the medium simple to use, yet powerful (Kerr & Hiltz, 1982). Software to maintain large distribution lists and conferences (permitting users to create new lists, add and delete their names from existing lists, and scan directories sorted by topic) has been credited with enabing the development of large electronic communities of interest (Wynn, 1980). Such communities change over time, and can support a fluid social structure. In broadcast terms, distribution lists, public conferences, and specialized bulletin boards are the ultimate narrowcasting medium. Such systems can be highly efficient at linking those in need of some information or service with appropriate sources of expertise (Malone, 1981).

Interactivity. Like interpersonal communication, receivers are able to rapidly provide feedback to message senders instead of the delayed or nonexistent feedback afforded by typical mass communication systems. Interactivity is a complex construct, however, with many additional implications (Rafaeli, 1985; Durlak, 1987). For example, CMC systems afford more than just the opportunity for audiences to interact with message creators. Rather, like a call-in talk show, an audience member's response can be distributed to the entire audience, any one of whom can then reply in a public format. Unlike talk shows, however, audiences can interact directly with each other, without funneling communications through a central mass communicator. In the case of large public distribution lists organized around some common interest, in fact, there often is no specific central communicator. Instead, communication patterns may resemble very large group discussions, as in computer conferencing. This makes CMC broadcasting useful for what Ball-Rokeach & Reardon term debate relationships: relationships based upon the expression of opinions. An unanticipated operational consequence of such mass discussions on electronic mail systems, however, is the exponential increase in network traffic that can result. This phenonemon, known as flooding, can be so severe that the system can crash. Also, interactive discussions with larger groups can pose challenges for organizing and controlling patterns of interaction. Issues arise in maintaining equitable shares of participation and turn-taking, regulating the pattern and flow of interaction, coping with dissensus, maintaining a leadership structure, and the host of other areas relating to group process in situations that permit feedback and interaction. These sorts of problems do not arise with the case of the passive audience of mass media.

The Individual User as Mass Communicator. In traditional mass communications, communicators are trained professionals, often supported by a team of professionals in the production process. Thus, messages have high production standards, and are designed for consumption by mass audiences. Individuals who broadcast messages on CMC systems

do so without any message production assistance, and are unlikely to be trained communication professionals. This increases the likelihood that broadcast messages will be faulty or perceived to be irrelevant, electronic junk mail. The growth of electronic junk mail has even led some to call for automatic screening programs (Denning, 1982). Strassman (1986) describes the tension between inhibiting the flow of junk mail, and potentially filtering out useful information. The combination of a limited bandwidth medium and inexpert communications can potentially increase problems in accurately interpreting CMC broadcast messages.

Reliance on Hardware and Differential Access. Ball-Rokeach and Reardon rate videotex messaging to be higher in hardware dependence than traditional broadcasting. Clearly for the average individual, costs of access are greater. Access to CMC is not as universal as to other mass media, raising concerns of information inequity. Access to costly personal accounts on public systems such as CompuServe is linked to socio-economic status. Access to accounts on organizational systems is limited in two key ways. First, some organized effort is necessary to purchase and implement a group - or organization - wide system. Second, allocation of accounts and terminal access on organization-wide systems is subject to constraints of organizational policy, hierarchy, and political factors. A related organizational resource is training on system functions - a resource that can be differentially provided to potential users.

Limited Sensory Cues. Much attention has focused on the limited range of nonverbal cues afforded by CMC. The fact that messages are primarily computer text only (although some networks now support graphics, and voice annotation will soon be incorporated) has lead to the classification of electronic mail as a "low bandwidth" medium that is low in social presence (the degree to which people perceive the co-communicators as socially and psychologically present) (Rice, 1984; Short, Williams, & Christie, 1976) and low in

richness (a dimension which reflects the usefulness of the medium for carrying ambiguous messages) (Steinfield & Fulk, 1986; Trevino, Lengel, & Daft, 1987). In spite of this classification by the research community, however, people have often been observed in field studies using CMC for what seem on the face to be quite emotional and interpersonally involving interactions (e.g. Hiltz & Turoff, 1978; Phillips, 1983; Rice & Love, 1987; Steinfield, 1985), and otherwise uninhibited behavior (Kiesler, Siegel, & McGuire, 1984). Ball-Rokeach & Reardon (1987) posit that the relative anonymity afforded geographic dispersion may even encourage intimate communications over CMC, a conclusion supported by the uninhibited and sometimes sexually explicit conversation that can be found on many "chat" or CB-like services. However, the limited range of nonverbal cues may encourage misinterpretation of messages (Fulk & Van Tassel, 1985; Kerr & Hiltz, 1982). Moreover, without the tempering effect of immediate verbal and nonverbal feedback during message construction, responses may be overly emotional, hostile, or critical. This phenomenom has occurred often enough to be given its own name - flaming (Wynn, 1980). Given that the senders of CMC broadcasts are unlikely to be trained communication professionals, the probability for misinterpretation and/or flaming is even greater. When such misinterpretation or inappropriate response occurs on a mass level in a CMC broadcasting situation, the potential harmful effects are magnified considerably.

Vulnerability to Intrusion. Most CMC systems can be accessed from telecommunications linkages, making them vulnerable to various forms of computer crime such as trespassing, vandalism, and theft. The broad threat of unwarranted access to electronic files has been of general concern recently, as shown by increasingly common incidents in which "hackers" have broken in to supposedly secure computer systems. For CMC broadcasting, new concerns include ensuring 1) integrity of the content of broadcast messages, 2) protection of systems from broadcasts by unauthorized persons, 3) and

verification that a broadcast message attributed to an individual was indeed sent by that individual. Much harm to a person's reputation can be done by accessing their account and broadcasting inappropriate content in their name. The current spread of computer viruses is further evidence of the consequences of abuses of CMC broadcasting (cf. Computer Viruses, 1988). Computer viruses are programs that, when "opened" by the receiver carry out some preprogrammed activity unanticipated by the receiver, ranging from displaying a simple greeting to actual destruction of files and even hardware. Such viruses may even be sent as electronic messages that, upon reading, are able to locate and retransmit themselves to any user "IDs" in the receivers electronic "rolodex." Many virsuses are reportedly spreading uncontrollably throughout computer networks (Cohen, 1987).

Relative Permanence and Limited Control of Message Disposition. Senders have little control over messages once they are sent. Messages remain in storage until receivers actually delete them, and even then a record may exist on some backup tape, as the recent "Irangate" controversy demonstrated. Receivers can make copies, forward to unintended recipients, or print hardcopies for distribution outside of the CMC system, all in a way that is transparent to original senders of messages. Moreover, system administrators can potentially trace the flow of communication with substantial precision. These characteristics raise concerns of privacy, security, and protection of broadcast CMC content. This, of course, is not unique to CMC broadcasting, however. Recent legal action regarding taping of television broadcasts for further distribution highlights a similar issue in mass communication. Nor can paper-based communications be totally immune from inappropriate copying and distribution.

Characteristics of CMC systems thus interact with broadcast applications to influence uses and effects, in ways that have important implications for practice and policy. Our analysis of similarities and differences is by no means exhaustive, and further conceptual

development is necessary. We now turn to a brief review of selected bodies of literature that can help us to further anticipate potential uses and effects of CMC broadcasting.

Theoretical Approaches to Understanding Uses and Effects of CMC Broadcasting

The potential use of CMC systems for mass communication has received little attention in the communication literature, with the exception of limited research on bulletin board systems and recent looks at videotex (Ball-Rokeach & Reardon, 1987; Rafaeli, 1985; 1986). We suggest that several traditional approaches to mass communication can provide useful insights into the process and effects of CMC broadcasting, even though this literature does not take the special characteristics of CMC into account.

A Mass Communication Perspective. Almost without exception, we find that the CMC literature emphasizes communication in organization settings for task-related purposes. Even consumer uses of videotex and information utilities tend to be viewed from an instrumental perspective, focusing on information seeking patterns of home consumers (e.g. Ettema, 1984). Yet, we know from field studies of CMC that systems may be used for communication activities unrelated to work, even in organizational settings (Steinfield, 1985). Marvin (1983) calls this the telecommunications "pleasure principle" and argues that not only should we anticipate that people will use systems in this manner, but also that such use is highly functional. It is in this area that the mass communication literature can provide useful insights into the nature of CMC broadcasting processes and effects. Mass communication theorists are accustomed to the entertainment function of media use. Using the classic set of functions of mass communications (Lasswell, 1948; Schramm, 1971), we anticipate that CMC broadcasting uses can be clustered into surveillance, consensus and control, socialization, and entertainment uses. Surveillance uses might include keeping track of what's happening around the company. Consensus

and control uses would involve the sharing of opinions, negotiating, resolving conflicts, and coordinating activites. Socialization activities might include learning appropriate actions to take in specific circumstances. Finally, playing games during breaks, or telling jokes would be good examples of entertainment uses of CMC broadcasting.

Taking another familiar mass communication approach, uses and gratifications, we can expand the earlier predictions about uses of CMC broadcasting. According to the conceptualization by Katz, Blumler, & Gurevitch, (1973), an individual's socioeconomic status influences their perceived needs, which in turn influence motivations to use media. Motivations influence usage patterns, from which gratifications are derived. A consequence of this line of thinking is that the motivations to use media must be identified, before specific media effects can be anticipated and understood. Such an approach to understanding the uses and impacts of home computing has also been proposed (Steinfield, Dutton, & Kovaric, 1988). Translating this approach into the organizational setting, we would expect that the extent to which CMC broadcasting is used for such purposes as surveillance, consensus, socialization, or entertainment will influence the perceived effects or gratifications derived from using the system. Gratifications might include such impacts as productivity benefits, developing more work contacts or friends at work, and feeling that information is more easily accessible. Potential negative consequences such as information overload are also possible.

Additional theoretical approaches to the study of CMC systems are rooted primarily in research on new information technologies in organizations. This research is not a single family of theories, however, and draws upon such diverse disciplines as communication, sociology, social psychology, psychology, organizational behavior, and economics. Below, we briefly review several streams of organizational research in order to derive some

expectations for a preliminary empirical investigation of CMC broadcasting uses and effects in one organizational setting.

Organization Design. Researchers concerned with the communication implications of structural aspects of organizations emphasize the inhibiting effects of hierarchies on horizontal communications (Galbraith, 1973; 1977; Tushman & Nadler, 1978). Direct communication links across organizational units is proposed to facilitate effective organizational responses to uncertainty in the environment. Electronic mail has been touted as a good tool for promoting cross-departmental information flow (Steinfield, 1986a). Recent conceptualizations of the special communication needs of research and development organizations also emphasize the ability of new information technologies to provide the benefits of a functional design, while utilizing multidisciplinary project teams (Allen & Hauptman, 1987). Functional designs group people of similar specialties together, so that their knowledge base remains current. Project designs bring the different specialties needed in modern R&D efforts together, but sacrifice the benefits of functional designs. Electronic mail and bulletin board systems are proposed to enable people of different functions who are geographically dispersed to maintain the currency of their knowledge base. Or, these systems can be used to link people of different specialties together for project work, in spite of physical separation. On the basis of this research, it would be expected that broadcast CMC uses will affect employees' perceptions of such factors as the quality of communication with other parts of the company, the cohesiveness of work units, and the coordination of work activities.

Critical Mass. CMC researchers have long noted the importance of having a critical mass of users if a system implementation is to be successful (Hiltz & Turoff, 1978). More recently, Markus (1987) articulated a critical mass theory to help explain diffusion patterns of new communication technologies. She observes that use of technologies such as

electronic mail is not an independent decision. Moreover, early adopters may rescind the adoption decision if a critical mass of users fails to develop. Empirical research has clearly demonstrated that frequency of use of CMC in organizations is a function of the extent to which relevant others are reachable by the system (Steinfield, 1986b). On the basis of these findings, we further expect that any effects of CMC use will be predicated upon having a critical mass of coworkers on the system

CMC and Productivity. A central concern in much of the prior CMC literature is the effect of system use on productivity. Although these researchers recognize the difficulty in measuring productivity of information work especially when efficiency and effectiveness are contrasted, there appears to be a consensus of opinion that CMC systems can enhance productivity. Elimination of shadow functions (unproductive activities, such as searching for information or dialing busy numbers that often go unnoticed, but that in the aggegrate consume significant periods of time), avoidance of telephone tag, automation of routine functions (such as addressing an envelope), freeing people from interruptions, and reducing the number of times information is transferred to different media are among the ways CMC systems are felt to enhance productivity (Bair, 1980; Rice & Bair, 1984; Strassman, 1986; Uhlig, Farber, & Bair, 1979). We thus anticipate that work-related uses of CMC broadcasting will be associated with perceptions of improved productivity.

A PRELIMINARY EMPIRICAL TEST

A survey of electronic mail users in a large decentralized organization in the office products business provides a preliminary look of broadcast applications of CMC. Employees used an electronic mail system with thousands of mailboxes, and which could support user-created public distribution lists of virtually any size. Moreover, users could mail the same message to more than one list by simply including all destination lists in the electronic

message address. In this way, it was possible to reach thousands of people simultaneously. Use of the system was free to employees, and there were few controls over how employees used the system. At the time of the study, there were hundreds of public distribution lists, with some oriented around work-related topics and others focusing on social activities, hobbies, and other non-work interests.

A questionnaire was mailed to 400 electronic mail users randomly sampled from a list of all mailboxes. Two hundred and twenty were returned, providing a 55% response rate. Respondents worked in a range of professional, managerial, and clerical jobs, although most were programmers (27%), engineering personnel (22%), and researchers (21%).

Independent and Dependent Measures

The brief literature review focuses our attention on three classes of variables: 1) some measure of the degree to which relevant coworkers are on the system, in light of emerging critical mass perspectives, 2) measures of the purposes, or motivations for using the system in a broadcast mode, and 3) measures of the effects of using the sytem. Our specific operationalizations are described below.

First, respondents indicated the size of their work unit, as well as how many work unit members were on the system. They also gave their estimate of the proportion of their work contacts outside their work unit who were on the system. The average of these two proportions was used as an estimate of the overall degree to which relevant coworkers were reachable via electronic mail (mean = 66.61%, s.d. = 30.51). For convenience, we refer to this variable as critical mass in the remainder of the paper.

The uses of CMC broadcasting were measured by asking respondents to rate on a 5 point scale the extent to which they used the system for a variety of purposes. Prior to the

survey, interviews were conducted with users to derive a list of all of the purposes for which they used electronic mail. From the 32 purposes mentioned in these interviews, ten represented applications of a more broadcast nature.

Another set of indicators of CMC broadcasting usage were four variables that specifically measured a respondent's membership patterns on various distribution lists. Specifically, we asked respondents the number of work and social distribution lists to which they belonged, as well as the number of work and social lists they had initiated.

The final set of measures, treated as dependent variables here, were the respondents' perceived effects of using the electronic mail system. As with the purposes of use, pre-survey interviews suggested a list of impacts that respondents to some degree perceived to result from electronic mail use. A set of twenty-one impact statements were measured by 7-point Likert type scales measuring the extent to which respondents agreed with a particular statement of effect.

Results

An exploratory factor analyses of the ten purpose of use items resulted in three factors roughly resembling three of the four functions of mass communication described above (Table 1). Consensus/control uses included asking questions in a public setting to force a response, polling opinions on a topic, broadcasting information requests, organizing social activities, and advertising or buying products for sale. Surveillance uses included keeping track of company happenings, and learning of events of interest. Finally, entertainment uses included participating in entertaining events or conversations, taking breaks from work, and filling up free time. Socialization functions were not represented by a specific factor in this analysis. It may be that socialization is best supported by other media such as face-to-face meetings, or it is done through more dyadic uses of the system. More likely,

however, socialization into organizational groups is accomplished as a part of the other broadcast activities, such as organizing social activities, even though these activities may also serve to foster consensus, achieve control, or entertain.

The 21 impact items factored into six clusters of effects (Table 2). The first factor included a series of items representing how well connected the user is with the company. A second factor contained items that reflected the potential information overload consequences of electronic mail use. Items representing flexibility of both time and space loaded on the third factor. The fourth contained two items that were concerned with the impersonalness of using electronic mail. The fifth focused upon the effect of using electronic mail on cohesiveness and coordination of the work unit. The last factor represented the effect of the system on the quality of information accessed by individuals. Three items representing productivity impacts all exhibited similar patterns of cross loading on several dimensions. For exploratory purposes, they were separated into a seventh scale.

For both the uses and the effect items, scales were created by averaging across the high loading items on each factor (summary statistics for all created scales and other variables are reported in Table 3). Respondents indicated the heaviest use of CMC broadcasting for surveillance purposes, generally a non-interactive application. Entertainment and consensus/control uses of CMC broadcasting were much less frequent. Regarding the effects of CMC use, respondents were more likely to feel that electronic mail resulted in having access to higher quality information, improved productivity, and improved connectedness with the company. Mean scores were at about the midpoint of the scale on the flexible work scale and the cohesiveness scale. Finally, respondents were somewhat less likely to perceive information overload as a result of the system, and did not agree that electronic mail resulted in a more impersonal workplace.

A multiple regression analysis strategy was used to assess the pattern of relationships between the critical mass and purposes of use scales, and the perceived impacts. Essentially, each perceived impact was treated as a dependent variable, and regressed on the critical mass and purposes of use scales, resulting in seven regressions (Table 4).

For four of the impacts, perceived connectedness, productivity, cohesiveness, and information quality, roughly one third of the variance can be explained by the combination of critical mass, membership on distribution lists, and purposes of use. This finding supports our basic contention that knowledge of uses is a prerequisite to explaining effects of new media (Steinfield & Fulk, 1986; Steinfield et al., 1988). The critical mass variable was a significant predictor for each of the four, underscoring the importance of universal access as a prerequisite to broader benefits of the use of new media. In addition to critical mass, the perception that broadcast uses of electronic mail had resulted in being more connected to others at work was predicted the amount of consensus and control uses (such as polling opinions, requesting information, and the like), entertainment uses, and work distribution list membership. Productivity enhancements were positively related to surveillance and consensus/control uses, as well as work list membership and critical mass. Cohesiveness also was predicted by consensus/control uses and critical mass. Finally, perceived improvements in information quality were predicted by surveillance uses, work list membership and critical mass.

A meaningful amount of variance in three impacts could not be explained by the set of independent variables used in this study. Flexibiity impacts were positively related to only work list membership, and negatively related to social list membership, but only 11% of its variance was explained. Those belonging to a larger number of work-related distribution lists were more likely to report that electronic mail use has freed them from the constraints of physical location and the eight-hour workday. Those belonging to large numbers of

socially-oriented lists were less likely to experience this impact. Finally, none of the usage variables, nor critical mass significantly predicted perceived information overload or impersonalness of the workplace.

Discussion

The pattern of findings described in this study provides several key insights into broadcast uses of CMC and possible effects in an organizational setting. Of course, generalizations are limited by the fact that we sampled from a single, profit-making organization. Almost no studies of electronic mail have been conducted in public or government organizations (Schmitz, 1987, is a notable exception). In addition, the organizational context provides a different set of constraints and utilization potentialities than do public systems such as France's Minitel or the American CompuServe. Further insights will be gained by future research designed to expand the base of settings in which CMC broadcasting can occur. At this point we can highlight several issues raised by the results of this preliminary investigation. First, it is important to note that people do use CMC systems for broadcasting in organizations. Although they do not broadcast messages as often as they send a one-on-one message (see Steinfield, 1985), even a rare broadcast is a new capability in an employee's communication arsenal. Never before could one employee reach all corners of a large, decentralized, multinational organization simultaneously with just a few taps on a keyboard. Of course, reachability of individuals will be constrained by any system configuration which limits access to certain mailboxes. The system we studied had no such access barriers.

Second, it is possible to cluster the purposes of broadcast CMC into functions that resemble categories from classic mass communication theory. That is, people appear to rely on CMC broadcasts for 1) surveillance purposes, such as keeping track of things occurring around the company, 2) consensus and control purposes, such as polling

opinions, or requesting information from large numbers of people, and 3) entertainment, such as participating in games or enjoyable conversations. Surveillance uses were the most frequent, and also more passive. That is, people use the system almost like a newspaper, as audiences for others' broadcasts. The multiplicative power of broadcasts requires only a small number of users who actually broadcast a message. What is different, however, is that the interactive capability of CMC enables what Ball-Rokeach & Reardon (1987) term "serendipity," since a user can develop a more interpersonal relationship with someone who has broadcast information of interest by simply providing a direct reply. Such use can thus efficiently link together sources of information with those who may be in need, as long as people willingly contribute useful information. Recent empirical research questions whether such "discretionary data" is likely to be provided, however (Thorn & Connolly, 1987). Interestingly, the use of CMC broadcasting for the consensus/control function had the greatest variety of impacts. This function was related to greater connectedness, productivity, cohesiveness, and information quality.

Third, even in an organizational setting, the system was used for entertainment purposes, and many people do belong to socially-oriented distribution lists. Of concern to the organization is whether this is unproductive, dysfunctional behavior, or if there is some benefit of this type of use for new employees. Steinfield (1985) argues that such uses actually may help to socialize new employees, acclimate them to the system, help them to form communication relationships that will be of value in future work task, and potentially enhance employees' abilities to approach problems creatively. In support of this perspective, Steinfield and Fulk (1988) found that newer and younger employees were more likely to engage in social and entertainment broadcast uses. Moreover, the finding that entertainment use predicts the perceived connectedness (more friends, contacts, and visibility) of employees to the company suggests that it may be functional. Interestestly, entertainment use was unrelated to any other impacts. It certainly does not appear to

enhance productivity, yet it does not appear to relate to increased reception of irrelevant mail either. Nevertheless, management concerns that expensive systems are being used for personal reasons on the job are understandable. This issue will require careful evaluation in multiple settings before firm conclusions can be drawn.

Lastly, establishing a critical mass of users does appear to be a prerequisite if work related benefits are to accrue. Those with a larger proportion of relevant coworkers on the system do believe that they experience greater connectedness to the company, access to higher quality information, more productivity, and feel that their work unit is more cohesive. Most likely, having such a critical mass enables people to utilize the system in a more diverse and instrumental fashion. In fact, Steinfield and Fulk (1988) have shown that critical mass is a significant predictor of broadcast usage purposes.

Policy Related Issues Raised by CMC Broadcasting

This preliminary survey is clearly of more direct relevance to those interested in the management of organizational communication and information flow in an age dominated by new information technology. If we assume that human behavior in organizational settings does at least in part parallel behavior outside of the job context, then the findings can indirectly suggest issues of broader societal concern. In this section, we provide rather broad speculation about possible societal policy concerns raised by the growth of CMC broadcasting, with the discussion only loosely tied to the data presented above. Additional fuel for speculation is derived from the conceptual distinctions made earlier between traditional broadcast media and CMC broadcasting.

Equitable Access to CMC Broadcasting. Given that CMC broadcasting is dependent upon relatively expensive hardware, software, and electronic mail services, we can clearly expect unequal access once we leave the organizational context. There is a great

deal of support, for example, for the belief that socio-economic status is one of the primary predictors of home computer ownership (Dutton & Rogers, 1988). Just as perceived benefits increase as universal access is approached in the organizational setting, benefits of CMC broadcasting by home users may also be predicated upon universal access. Yet it appears highly unlikely, given present trends in home computer ownership, that universal access is a probable outcome. A related concern stems from the finding that increased usage does relate to increased benefit. In the home context, services are unlikely to be subsidized to the extent they are for employees in an organization. With usage sensitive pricing strategies, we would expect much less use, and hence less benefit for economically disadvantaged groups.

Social Benefits of CMC Broadcasting. The respondents in the survey indicated a number of benefits of CMC broadcasting that may have a parallel in the home context. First, there was a perceived improvement in productivity and information quality resulting from electronic mail use, and greater CMC broadcasting was associated with greater benefit. In the home context, CMC broadcasting might also enhance instrumental uses such as information seeking activities. Recent research into citizens' access of a local government computerized bulletin board provides a look at one class of instrumental use (Schmitz, 1988). Second, the finding that CMC broadcasting related to perceptions of improved connectedness with others in the company may also have portend benefits for home users. Interestingly, an earlier study found that the newer and younger employees were the most likely to use the system for socially-oriented broadcast purposes. In the home context, we might speculate that CMC broadcasting could potentially facilitate the establishment of social network links for new members of a community, or young people. The current popularity of chat lines and CB simulator type services among younger people is evidence of this social function of computer-mediated communication in the home context. As with the organizational setting, benefits, however, will depend upon universal

access to hardware as well as the necessary communication lines and electronic mail services.

Potential Negative Consequences of CMC Broadcast Growth. One issue that failed to surface in the survey findings was a strong concern with the growing spread of "junk" mail. In our conceptual analyses, we noted that some characteristics of CMC broadcasting, most notably the fact that individuals were not necessarily trained professional communicators, could lead to a growth in irrelevant mail and/or misinterpretation of messages. Employees in the survey highlighted the growth in irrelevant mail as a potential problem in an earlier set of interviews. Yet, the majority did not feel this was a significant problem in the survey, and there was not relation between CMC broadcasting and perceived overload from irrelevant mail. This may, however, be a finding that is dependent upon the specific organization site. Moreover, we might expect that the probablilty of receiving irrelevant information will be much greater when you remove the homogenization effect of a single organizational context. As we move to home use and intercompany electronic mail, junk mail may become an increasingly nagging problem. Expanded telemarketing activities, for example, may result in the spread of "direct electronic mail advertising." Recent complaints of the spread of telemarketing by facsimile machines attests to the attractiveness of this form of advertising. Employees in the survey did occasionally use the system to advertise products for sale, and many bulletin boards have become convenient places to announce equipment for sale. Here we might distinguish between a "direct mail" advertisement that is addressed to an individual, and an advertisement that is simply posted in a public place for those who wish to browse. It is the former that seems to be the most troublesome, as it requires action by the receiver to process and dispose of the message. It may even be difficult to distinguish an advertisement from a personal letter from another individual until it has consumed valuable time and resources.

A second concern involves the security and privacy of CMC broadcasting. We noted earlier that CMC broadcast systems are vulnerable to intrusion. Although the survey did not directly address concerns with privacy and security, the growth of CMC broadcasting inevitably raises these concerns, particularly as consumer and interorganizational systems are developed. The very troubling computer virus issue is illustrative of a new type of network vandalism that will be exacerbated through broadcast uses of CMC. Questions of liability for damage caused by viruses are examples of potentially sticky issues in this area. There has been a move, for example, to prosecute bulletin board owners whose systems are used for the illegal transfer of credit card numbers and the like. Are these individuals also responsible for damage caused by a virus embedded in public domain software (or even unauthorized copies of software) that is stored on their system?

We also noted that senders do not have control over the ultimate disposition of their messages, leading to additional types of security concerns. An example provided by Zuboff (1987) illustrates the potential damage that can occur when information stored in electronic form passes into unintended hands. It seems that a group of employees were using a distribution list to air gripes about their company, under the assumption that their "conference" was closed and hence, private. An executive found out about the conference, joined it, and printed out the full transcripts of comments. He then circulated the transcripts to other executives, commenting that such behavior was inappropriate. To top it off, a mailroom employee saw the document, and circulated copies throughout the company!

This attribute of CMC can be related to a different, but equally troublesome policy issue. New computer-based media have generally wreaked havoc with existing systems for the protection of copyright, particularly in the software area. CMC broadcasting further magnifies these problems by potentially allowing the unauthorized spread of content and

software to large numbers of people simultaneously. As receivers forward content to ever more distant destinations in a network, any sense of ownership over the content can be lost. Even those who would seek permission to use content may find it difficult to trace its creator.

Lastly, the occurrence of unhibited communication behavior, flaming, and the fact that the broadcaster does not have to be a trained or licensed professional raise additional concerns for the policy arena. These trends suggest that one type of emerging home use of CMC systems may be for pornographic communication. Observations of the French experiences with the Teletel system provide preliminary support for this expectation. Similar experiences with 900 and 976 services, and the growth of "phone sex" are further evidence that this type of home use for CMC broadcasting may indeed become prevalent. Policy makers will then struggle with the inevitable questions regarding control of the content of CMC broadcasts.

The concerns mentioned above are just a sampling of what we might derive from the growth of CMC broadcasting. Although our preliminary analyses suggest that social benefits can result from the use of CMC broadcasting, there are certainly a host of potential negative consequences that may inhibit the successful application of CMC on an interorganizational and home consumer basis.

Conclusions

Broadcasting over CMC systems is occurring in a variety of contexts, and indications are that such applications will become more common. Although sharing some of the basic features of traditional mass communication media, our analysis has identified several ways in which CMC broadcasting is different as well. We have concentrated our theoretical development and empirical analysis on CMC broadcasting in organizational settings, and

provided a brief introduction to potential policy concerns on an interorganizational and societel level. Although there should be some carryover to the home and other contexts, understanding the process and effects of CMC broadcasting in these other contexts will require additional conceptual development. The organizational context is a useful beginning place, however, because it is in these settings where we are likely to find the largest numbers of systems and users.

Looking at organizations requires a synthesis of organization and mass communication theory. In this research, we applied organization theories to help identify both uses of CMC broadcasting and their possible impacts. Mass communication approaches were useful in interpreting clusters of uses, as well in placing uses and effects into a larger framework.

One direction for future research is to explore the relevance of mass communication effects approaches to understanding CMC broadcast impacts, particularly as the technology moves to the home context. For example, agenda setting theories may provide new insights into possible implications of heavy system use for surveillance purposes. It is possible that individuals who are heavier broadcasters may influence people's agendas on important issues. Recent research on social information influences on employee attitudes and behaviors suggests that agenda setting effects may be likely (Fulk, Steinfield, Schmitz, & Power, 1987). An adaptation of knowledge gap theories may also be employed to address equity and access concerns. It may be that more computer literate and technically sophisticated employees are able to gain access to and use valuable lists and bulletin boards, increasing the gap between information haves and have nots. Finally, socialization theories may be particularly useful in explaining the reliance of new employees on CMC broadcasting, and suggest applications of the technology for newcomers to other types of social contexts.

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TABLE 1: Factor Analysis of Purposes of CMC Broadcasting*

	Surveil-lance	Consensus/ Control	Entertain-ment
Fill Up Free Time	.85	.25	.09
Take Breaks From Work	.84	.34	.19
Participate in Entertaining Events	.66	.53	.37
Ask Questions in Public Setting	.23	.79	.05
Poll Opinions	.49	.76	.14
Broadcast Info. Requests	.11	.74	.29
Organize Social Activity	.44	.65	.28
Advertise/Buy Products	.45	.47	.30
Keep Track of Company Happenings	.04	.18	.88
Learn of Interesting Events	.59	.28	.73
Variance Explained = 62%	38.6%	12.4%	11.1%

* Principal Components with Oblique Rotation

TABLE 2: Factor Analysis of Impacts of Electronic Mail Use*

	Con-nect	Over-Load	Flex-ible	Imper-sonal	Cohe-sive	Info. Qual.
Have More Friends	.85	-.07	.28	-.01	.39	.26
More Visible at Work	.82	.02	.35	-.07	-.45	.35
Have More Work Contacts	.78	-.01	.39	-.13	-.40	.51
Keep in Touch More	.72	.01	.37	-.04	-.42	.50
Swamped With Info.	.08	.83	.02	.09	-.02	-.11
Time Wasted Reading Mail	-.13	.73	-.13	.35	.29	-.03
Overloaded After Trips	-.01	.69	-.03	.03	-.32	.24
Irrel. Info. Wastes Time	-.41	.64	-.10	.30	.10	.07
Supervisor Different Loc.	.22	-.15	.89	.11	-.23	.15
Work Outside Workday	.25	-.06	.80	-.03	-.32	.34
Coworkers Different Loc.	.38	.12	.78	.07	-.13	.10
Place Less Personal	-.12	.16	-.02	.82	.12	-.01
More Closely Supervised	.13	.14	.20	.78	-.09	-.13
Dept. More Cohesive	.39	-.03	.28	-.03	-.91	.28
Work More Coordinated	.45	.08	.30	-.06	-.88	.27
Know More About Company	.35	.01	.18	-.04	-.20	.83
Get More Timely Info.	.48	.09	.43	-.18	-.47	.74
Get More Accurate Info.	.40	-.04	.38	-.27	-.47	.71

* Principal Components with Oblique Rotation

** Three items, Work Faster, Have Fewer Interruptions, and Work is Higher Quality, did not load principally on any dimension, but exhibited the same cross loading pattern across the cohesiveness, connectedness, and information quality dimensions. These items were separated and combined to form a productivity scale, and the factor analysis rerun.

TABLE 3: Descriptive Statistics on All Variables

	Mean	Std Dev	Alpha
Critical Mass			
(Percent of Relevant Coworkers on System)	66.61	30.51	
Purposes of Uses			
Consensus/Control	1.97	.70	.74
Entertainment	2.15	.91	.55
Surveillance	3.45	.93	.75
Distribution List Membership			
Work DLs Member	6.90	7.17	
Social DLs Member	5.33	5.25	
Work DLs Founded	.81	2.59	
Social DLs Founded	.37	2.16	
Perceived Impacts			
Connected	4.17	1.39	.86
Info. Overload	3.56	1.09	.71
Flexible Work	3.96	1.64	.77
Impersonal	2.33	1.02	.50
Cohesive/Coor.	3.98	1.59	.85
Info. Quality	4.96	1.10	.77
Productivity	4.55	1.47	.88

TABLE 4: Predicting Impacts from Broadcast Uses

	Dependent Variables						
	Con-nect	Over-Load	Flex-ible	Prod-uctive	Imper-sonal	Cohe-sive	Info. Qual.
Independent Variables							
Purposes of Use							
Surveillance				.21**			.28***
Consensus/Control	.20*			.23*		.28**	
Entertainment	.20*						
Distribution List Use							
Work DLs Founded							
Work DLs Member	.29**		.22*	.23*			.28**
Social DLs Founded							
Social DLs Member			-.22*				
Critical Mass							
Percent of Relevant Coworkers on System	.16*			.29***		.44***	.23**
Variance Exp. (R2)	..32	NS	.11	.29	NS	.36	.29

* p<.05
** p<.01
*** p<.001

Table entries are standardized regression coefficients (betas).